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|--|-------------|----------------------|-----------------------------|------------------|
| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/692,243 | 10/22/2003 | Arthur Sherman | ASMMC.9CP1DV1D | 8398 |
| 20995 7590 02/20/2007 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614 | | | EXAMINER TUROCY, DAVID P | |
| | | | ART UNIT 1762 | PAPER NUMBER |
| SHORTENED STATUTORY PERIOD OF RESPONSE | | | NOTIFICATION DATE | DELIVERY MODE |
| 3 MONTHS | | | 02/20/2007 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/692,243

Applicant(s)

SHERMAN, ARTHUR

Examiner

David Turocy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/27/2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/27/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicants amendments, filed 12/27/2006, have been fully considered and reviewed by the examiner. The examiner notes the amendments to the independent claims 1 and 8. Claims 1-11 remain pending in the instant invention.

Response to Arguments

The applicant's arguments with respect to the 35 USC 112 1st paragraph rejection have been considered and are deemed persuasive, therefore the rejection has been withdrawn.

The applicants argue against Bedair, stating that the reference discloses using hydrogen radicals only for epitaxial deposition of semiconductor materials and that the teachings are limited to only that process. The examiner disagrees. Bedair discloses known and suitable method for deposition and the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

The applicants have argued against the references stating that they fail to disclose atomic oxygen in the process. However, the examiner notes such a process is not commensurate in scope with the claims because the claims require supplying oxygen atoms and that the oxygen atoms convert the first reactant to silicon dioxide.

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The oxygen precursor as supplied by the prior art does contain oxygen atoms, which do in fact convert the first precursor to silicon oxide and therefore reads on the claim as written.

All other arguments are deemed moot because they are directed to newly added limitations that were not present at the time of the final rejection and such are addressed in the rejections to follow.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 12/27/2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandaresan (US 6,064,077) in view of Bedair (Atomic Layer Epitaxy Deposition Processes) and further in view of Faraone et al (US Patent 4604304)

Sandaresan teaches a method of forming silicon dioxide in which monolayers of silicon are deposited by an epitaxy process and then oxidized in an oxygen environment

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(column 2, lines 28-54). The process is open to any suitable epitaxy process that forms monolayers in a layer-by-layer fashion (column 2, lines 20-28). The reference is silent to using the claimed process for forming the silicon layer. However, Bedair teaches an ALE process in which monolayers of silicon are deposited using atomic hydrogen in a layer-by-layer fashion (section VIII). The process reads on the applicant's claimed method. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use the method taught by Bedair to deposit the silicon in the process taught by Sandaresan. By doing so, one would have a reasonable expectation of success, as Bedair teaches the art recognized suitability of using such a process.

Sandaresan in view of Bedair fails to disclose repeating the steps of depositing silicon and oxidizing. However, Faraone discloses a method for depositing silicon on a substrate and oxidizing and then repeating the process to deposit a silicon dioxide layer of desired thickness (abstract). Faraone discloses oxidizing silicon in multiple steps has an increased efficiency over a process that deposits an entire layer and then oxidizes the entire layer (Column 1, lines 45-50). While the examiner notes Faraone discloses depositing layer thicknesses greater than Sandaresan, Faraone discloses the incremental layer thicknesses can be smaller than the disclosed thicknesses (Column 2, lines 57-65).

Therefore, one of ordinary skill in the art would have been motivated to have deposited the silicon dioxide film of Sandaresan in view of Bedair by incremental

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deposition of silicon and thermal oxidation with a reasonable expectation of success to reap the benefits of an improved thermal oxidation step.

5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandaresan (US 6,064,077) in view of Bedair (Atomic Layer Epitaxy Deposition Processes) and further in view of Molsa and Faraone et al (US Patent 4604304)

Sandaresan in view of Bedair teach all the limitations as discussed above, however the references fail to teach of the repeating deposition cycles. However, Molsa, teaching of an ALE deposition discloses depositing a cerium oxide by repetition of depositing cerium and then oxidizing, with removing gases in between. Additionally, as discussed above, Faraone discloses that incremental deposition of silicon and oxidation provides a thick silicon dioxide more efficiently. Therefore it would have been obvious to one of ordinary skill in the art, taking the references collectively, to have modified the process of Sandaresan in view of Bedair to oxide during each deposition cycle, as suggested by Molsa with a reasonable expectation of success because Faraone discloses silicon can be oxidize incrementally to deposit a thicker film more efficiently. The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375.

6. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bedair (Atomic Layer Epitaxy Deposition Processes) in view of Morishita (New

Substances for Atomic-Layer Deposition of Silicon Dioxide) and further in view of Faraone et al (US Patent 4604304).

Bedair teaches the basic mechanism of ALE in section I and further teaches the use of radicals as the second reactant (section VIII). The reference is silent to the silicon precursor comprising oxygen. However, Morishita teaches suitable precursors for use in a two-step ALD process (table 1, section 2). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use these precursors in the process taught by Bedair. By doing so, one would reap the benefits of forming silicon dioxide layers in less steps than the three step method discussed above for claims 1-7.

Bedair in view of Morishita fails to disclose repeating the steps of deposition process. However, Faraone discloses a method for depositing silicon on a substrate and oxidizing and then repeating the process to deposit a silicon dioxide layer of desired thickness (abstract). Faraone discloses oxidizing silicon in multiple steps has an increased efficiency over a process that deposits an entire layer and then oxidizes the entire layer (Column 1, lines 45-50). Therefore, it would have been obvious to one of ordinary skill in the art to modify Bedair in view of Morishita to increment the deposition with a reasonable expectation of successfully depositing a silicon oxide layer because Faraone reasonable teaches to one of ordinary skill in the art to incrementally deposit the layer and oxidize the layers will deposit a silicon oxide layer more efficiently.

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7. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bedair (Atomic Layer Epitaxy Deposition Processes) in view of Morishita (New Substances for Atomic-Layer Deposition of Silicon Dioxide) and further in view of Molsa and Faraone et al (US Patent 4604304)

Bedair in view of Morishita teach all the limitations as discussed above, however the references fail to teach of the repeating deposition cycles. However, Molsa, teaching of an ALE deposition discloses depositing a cerium oxide by repetition of depositing cerium and then oxidizing, with removing gases in between. Additionally, as discussed above, Faraone discloses that incremental deposition of silicon and oxidation provides a thick silicon dioxide more efficiently. Therefore it would have been obvious to one of ordinary skill in the art, taking the references collectively, to have modified the process of Bedair in view of Morishita to oxide during each deposition cycle, as suggested by Molsa with a reasonable expectation of success because Faraone discloses silicon can be oxidize incrementally to deposit a thicker film more efficiently. The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

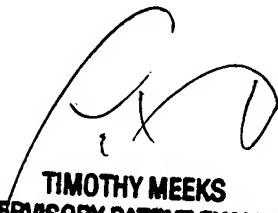
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David Turocy
AU 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER